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ORGANOBORON COMPOUNDS. VII. ACTION OF
PHOSPHORUS PENTACHLORIDE ON ESTERS OF ARYLBORIC ACIDS

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Mixing of an ester of arylboric acid with one equivalent of phosphorus pentachloride results in a smooth reaction, the products of which are an ester of arylchloroboric acid, an alkyl halide and phosphorus oxychloride, according to the equation:



where Ar = C_6H_5 , $\text{o-CH}_3\text{C}_6\text{H}_4$.

In this manner, starting with butyl esters of phenylboric or o-tolylboric acids we obtained the corresponding butyl esters of phenylchloroboric and o-tolylchloroboric acids. These compounds are of note as first examples of a new type of organoboron compounds in which boron is bonded to an aromatic radical, a halogen and an alkoxy radical.

EXPERIMENTAL

n-Butyl Ester of Phenylchloroboric Acid

To 44.3 grams (0.2 moles) of n-butyl ester of phenylboric acid, placed in a Claisen flask, 41.7 grams of phosphorus pentachloride are added in small increments with constant shaking. Upon completion of reaction, which is carried out with heating, the n-butyl chloride and the phosphorus oxychloride by-products are removed by distillation (using dry ice cooled receiver), after which the product ester is also distilled. 29.5 grams of n-butyl ester of phenylchloroboric acid are obtained as clear, colorless liquid, B.P. 104-105° C. at 9 mm.Hg; d_4^{20} 0.9962. Yield is 75% of theoretical.

Analytical data:

Found:	C 55.64, Cl 18.3
Calc. for $\text{C}_{10}\text{H}_{14}\text{BOCl}$:	C 55.59, Cl 18.01

As by-products, 17.4 grams of n-butyl chloride and 27.4 grams of phosphorus oxychloride were obtained.

Isobutyl Ester of o-Tolylchloroboric Acid

For this test preparation 24.4 grams (0.1 moles) of isobutyl ester of o-tolylboric acid and 20.8 grams of phosphorus pentachloride were used in the procedure as described above.

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Upon distillation, 10.1 grams of isobutyl ester of o-tolylchloroboric acid were obtained. B.P. 114-115° C. at 10 mm.Hg, 110-111° C. at 8 mm.Hg. This ester was again found to be a clear, colorless liquid, fuming in the air, d_4^{20} 0.9918. Yield equals 86% of theoretical.

Analytical data:

Found:	% B 5.40; Cl 16.3
Calc. for $C_{11}H_{16}BOCl$:	% B 5.22; Cl 16.8

As by-products, 8 grams of isobutylchloride and 11.7 grams of phosphorus oxychloride were obtained.

CONCLUSIONS

The action of phosphorus pentachloride on the esters of phenylboric and o-tolylboric acids results in formation of the esters of phenylchloroboric acid are obtained.

Translated by:
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